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EXCURSIONS IN COLLEGE GEOGRAPHY*

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THE excursion in geography is based on two fundamental principles of education. It has long been recognized that first-hand knowledge must form the foundation on which all other knowledge of a subject rests. Nor is it questioned that in higher education training in research is more than information. Learning is not enough to make the scientific scholar; he must be trained to observe, to arrange, to compare, to draw inductions, to propose hypotheses and test them, to solve the problems of his science.

If the application of these principles has been less thorough in geography than in other sciences, it is only because of the difficulties inherent in our subjects. The phenomena with which we deal are for the most part too large to be brought to the laboratory for observation and experiment. If we study them first hand and with the technic of research it must be in the field.

The excursion, therefore, in the earth sciences has the same place as the laboratory has in other studies; it gives first-hand knowledge and definite and accurate conceptions of reality; it teaches the methods of investigation. The field has a smaller place in teaching geography than the laboratory has in other sciences; but this is not because its value is underrated, but only because it is less manageable than the laboratory as an educational instrument.

As outdoor laboratory work the excursion meets with climatic difficulties. In latitudes of severe winters it is suspended during much of the college year. Our schedules must be arranged—perhaps I should say disarranged—so as to bring the topics where field work is most needed at the beginning or at the end of the year's courses. The field work thus crowded into a few months of fall and spring

* Read at the Eighth International Geographic Congress.

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is restricted further by the weather, and how serious this restriction may be, those teachers know who have experienced an October or a May of rainy Saturdays. The uncertainty of the weather makes it difficult to arrange our programs in advance, and the field meet designed to introduce or to illustrate a given subject must often be postponed until it has lost its pertinence or be given up altogether.

Nor is it easy to avoid conflicts with the other engagements of our students. In most schools the excursion cannot be assigned definite place on the college roster, and the regularly scheduled exercises of each day hold the right of way against it. The excursion cannot be limited to the hour or two allotted to other college exercises, but requires often half a day at least. Conflicts are therefore numerous where it must be foregone in favor of recitations or other scheduled exercises. It is thus usually deferred until the Saturday holiday, where it competes with athletic sports and unduly lengthens the working week both of student and instructor. In some schools the employment of student assistants permits an excursion to be scheduled on the college roster for four afternoons a week, and the student registers for field work on that afternoon of each week in which his time is free. Such a delightful comity prevails in several universities that students are excused — "cheerfully excused," one correspondent writes me—by their departments for absence on excursions, though of course the work is to be made up later. But I see no general relief in sight from these conflicts until the excursion comes to be considered as a college sport instead of an essential part of scientific education. When the field day in geography is once placed on the same plane with football, our students can be taken by the day and week hundreds of miles away and excused from all their classes meanwhile.

Certain difficulties are more or less inherent in the excursion. The number participating may make it impossible to give close supervision and direction to the individual student. Our young people, exhilarated by their unaccustomed release from sedentary tasks, tend at first to look upon the excursion as an outing and to take an attitude of mind more suited to a picnic than to serious study. As the field meet is held more often, and as students are sent out in small parties each in charge of an assistant, such difficulties diminish, and they practically disappear with thoroughly interested students and those in advanced courses. To meet these difficulties, however, requires all the qualities of the successful class room and laboratory

instructor raised to the *n*th power. The important problems must be set clear in view, investigation must be directed, and the attention of the class is to be held under circumstances which cannot fail to be distracting. To make the exercise to all who take part in it one of earnest intellectual effort without impairing its natural pleasure taxes a teacher's skill if not his patience, and requires a thorough knowledge of the local field, studied preparation of methods, and experience in this kind of work.

So various are the subjects studied in the field and the purposes in view, that even in elementary courses no uniform methods are adopted. Any lecture is certainly out of place. A short demonstration may be useful in closing the exercise, or such a review may be postponed to the recitation hour when the students' papers on the excursion are presented.

In general, the end of the excursion is best met by whatever method rouses the student's interest and effort and leads him to describe accurately what he sees and to think out clearly the causes of it for himself. That field work has the greatest zest, I think, to which the student brings for solution problems which have already risen in the lecture room and laboratory. He holds in mind various hypotheses by which the facts might be explained, together with the critical phenomena which would decide in favor of one hypothesis or another, and his search for these decisive evidences can hardly fail to be diligent and fruitful.

In many cases problems cannot well be brought before the student until the field is reached, but here also they may be set forth with advantage early in the exercise rather than at its close. Facts which might seem trivial so long as they were unrelated details of observation gain dignity when they are seen to lead up to large conclusions. Thus in the study of the not uncommon sections in the middle west of the United States, where deeply decayed rock mantled with residual clay is overlain with till, the question whether the rock decay is older or younger than the deposit of the till may be raised as soon as the general relations of the section are well seen. With this problem in view the discovery of fragments of residual clay kneaded in the till becomes to the student one of the first importance, proving the clay preglacial and that a continental glacier may move over rotten rock and its residual clays and leave them disturbed but little.

Some topics may best be opened in the field without the prepara-

tion of any previous study. Investigation of a section of the drift may well begin class work on glaciers. The characteristics of loess are better learned at outcrops than from any text-book. Care is needed to advance no step beyond the facts open to observation and the inferences which may be drawn clearly from them. Least of all in the field is there place for the dictum: Thus saith the authority. If questions rise to which the facts before us give no answer, let them go unanswered for a while and trust to an awakened curiosity to continue the search. The active, investigative attitude of mind is to be encouraged, not the passive attitude, the listening ear.

Individual effort is stimulated by requiring of each student a formal report of his work. His field notes are written fully on the spot. With beginners, suggestive questions are needed at every step, and before any subject is left some notes may well be read for correction and addition by the class, while the appeal in case of disagreement can yet be made to Nature. Sketches, maps, and diagrams are prepared, and may be inspected also as far as possible, on the spot. Some pains are taken by the instructor to have the reports conform to the rules of scientific writing. The uninitiated need warning to avoid all that is subjective, to omit references to the weather, the route, and incidents of the trip, and to describe in simple phrases the things which they have studied, stating logically the inferences which they have drawn.

Even in elementary courses considerable is taught of the use of instruments—the compass, the hand level, the aneroid, the clinometer. Distances are paced, dimensions and angles of slope are estimated by the eye as well as measured afterward. Contour sketching is practiced in the field and the data taken for the preparation of maps and sections.

In more advanced courses, study, mapping, and technical description are made more systematic. Small areas are mapped with the plane table. Students are given special areas to work out independently and their final reports rise to the dignity of theses.

There is one general preparation for the excursion which I am convinced is greatly needed. If our students do not "tackle" well the problems of the field, it is probably not only because of their inexperience in outdoor study, but also because they are unaccustomed to solve problems in the class room. Lectures, library references, and text-book recitations do not encourage the investigative attitude of mind. The departure most needed in our text-books and our

teaching is the wider, freer use of problems, whose function in our inductive science will be that of the exercises of inventional geometry. If, for example, the means of discriminating contemporaneous lava flows from sills have been worked out in class room and laboratory exercises, one of the best possible preparations has been made for an excursion to some outcrop of the traps of the Newark system of the Connecticut Valley or of northern New Jersey, often visited by students.

The scope of the excursion is limited. The field accessible to the most favorably located school is far from embracing all the phenomena of earth science All topics cannot be studied in the field, nor need any topic be studied there alone. But if the excursion secures even a little first-hand knowledge, that leaven will permeate and vivify the entire body of knowledge of our science. A little field study of land forms, sufficient to make the subject real, to develop the topographic sense, to give some few type specimens for reference, to bring into clear view the slow, sure workings of earth forces in the present and in ages past, to train in methods of research — even a little field work will lay the foundation on which the superstructure may be raised by other means.

Models and photographs are only a step removed from Nature. To study a good model, such as that by Howell of the Chattanooga district, might almost be called field geography. The photograph projected by the lantern of the glacier, the sea cliff, the lava flow, the desert dunes, or the dissected peneplain, gives almost the sense of reality of the view of the thing itself, and is to be studied by much the same methods of the excursion—as phenomena to be described, presenting problems for solution. When contour mapping has been well learned in the field, topographic maps and charts open up the land forms of a large part of the world to laboratory study.

Every college teacher knows how greatly the excursion is still needed even in its elementary exercises. Our students have not seen things nor have they learned to see things. Only a small per cent of college students, at least in the western states, have done field work in secondary schools. The attention of most of our students has never been called to the phenomena of our science. Of course they have not seen them, any more than they have seen the structures of leaves and flowers, unless they have studied leaves and flowers in botany. The training which students have received in other studies is not our training and cannot take its place. As one's memory for

faces is not strengthened by committing vocabularies, so a critical observation of Greek accents, or of organic tissues under the microscope, does not make the student ready to read the lessons of the sky line and the profiles of hills and valleys. On the whole the conceptions of the college student in our science as he comes to us are faint and hazy—undertimed, under developed, and unfixed negatives—and are derived largely from words and not from things. His education has been largely bookish. The study of nature in the field throws the average student into a new element where the support of authority is wanting, and he is decidedly uncomfortable until he has learned to swim. Our students crowd about the instructor to obtain some authoritative word for their field notes far more eagerly than they turn to investigate a section for themselves. The conception derived from books of what they ought to see blurs the impression on the retina of the thing itself. Thus students standing in the dry channel of a little brook have told me that the pebbles were well water worn and rounded, while in fact they were subangular stones washed from the adjacent bank of drift. The university student who, on a field trip to an interesting Ordovician shale, packed with fossils, flat lying, and hardly altered from the sea mud it once was, cried out after the instructor's demonstration, "But, Professor, where is the volcano which threw out all this stuff?" is an exceptional case, but I infer that she was studying volcanoes at the time.

From communications from many American colleges and universities giving in detail the field work done in earth science, I am assured that the excursion holds an increasingly large and valued place. In a number of elementary courses outdoor laboratory work counts one-third. In general our best higher schools can say in the words of one of my correspondents, "We have all the excursions we can get in."

It is in the University Summer School, or Summer Quarter, where the students' entire time is at command, that the excursion has developed to its best. Field courses are offered by a number of our schools, in which small parties of advanced students spend five weeks or more of the summer in camp in the serious study of some area. Among the regions where such investigations were in progress in the summer of 1904 were eastern New York, central Wisconsin, the Lake Superior region, The valley of the Mississippi bordering Illinois, the Black Hills, the Big Horn Mountains, the Colorado Rockies, the Great Basin ranges of Nevada, the Grand Canyon of the Colorado

River, and the Hawaiian Islands. An equally thorough training for the cadets of our science is afforded where, as at least in four states of the Union, the State Geological Survey is so closely connected with a university that capable students are employed on the field work of the survey during the summer vacation.

It is from these university field courses and from work on the United States geological survey, the geological survey of Canada, and the various state surveys that young American geographers are now graduated.

RESPONSE TO SURROUNDINGS—A GEOGRAPHIC PRINCIPLE

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PROFESSOR DAVIS, giving a modernized extension of Ritter's view, says: "The essential in geography is the relation between the elements of terrestrial environment and the items of organic response." He would not confine geography to the study of the earth as the home of *man*, but would carry the inquiry so far as to include the relations between the earth and all living things.

It does not require a scientist to note how prevalent is the principle that living things—plant or animal—are singularly adapted to their environment. It is, however, a relatively modern view to look upon all organic forms as a response to that environment. Once men thought, and not unnaturally, that all living creatures are made *for* their particular surroundings. We now see that they are as truly made *by* those surroundings; nor does this view exclude the operation of a divine intelligence in nature.

Modern geography, when dealing with the science maturely, is seeking to trace and establish the relations which exist between living things and their physical surroundings. As man is the most important and most interesting of earth's inhabitants, he is naturally the center of interest in the study of geography. But, owing to man's superior intelligence and his power over his surroundings, it is not always easy to determine how far his activities are governed by his earth surroundings and how far he has subjected them to himself. The oceans and the mountains were once very serious barriers to

human intercourse. Now man has largely vanquished these barriers, as such.

With creatures lower than man, however, physical environment amounts almost to actual control. The various species of plants and animals have each responded to a particular set of surroundings; every organ is delicately adapted to just these surroundings. They are the creatures of their environment and, for the most part, they cannot exist outside of it.

Life seems to be the most aggressive and insistent thing in the world. It is found almost everywhere, in the cold climates and in the hot; in the dry and the wet; in the earth, under the earth; in the air and in the sea. No matter what the conditions may be, some creature is happy there. It just suits him, for he is made for and by just such a place. The bird lives in the *air* and so requires some organ to get the oxygen from the air for his use; hence, lungs. He moves in the air, hence he has acquired a fluffy coat of feathers, light, hollow bones and relatively large wings. If he varies his habits and swims, he has webbed feet. If he wades, he has long legs and neck. If he scratches, he acquires sharp toes.

The fish anatomy is a response to a different kind of environment; not air, but water—a much more dense and buoyant fluid. The fish doesn't need feathers, and hollow bones, and feet; so his epidermis develops scales in place of feathers; his appendages become fins instead of wings and feet; and he gets oxygen by means of gills instead of by lungs. He would have had lungs if they suited his purpose better than gills, but they do not. The bird swims in air and the fish in water, fluids of different density, hence the difference between the bird's fins and the fish's. Furthermore, the anatomy of the bird, for example, is not simply a response to an aërial life, but it is a response to an aërial life on the *earth*. The earth's atmosphere has a particular composition and density. Were there different proportions of oxygen and nitrogen in the air, or were the air of different density, the whole bird anatomy would have been different. So, also, in the case of all breathing things. The structure of birds on Venus or Mars, if birds there be in those worlds, is a response to a different set of conditions from those on the earth; hence those birds are not like the ones with which we are familiar.

The distance of the earth from the sun, the density of its atmosphere and the inclination of its axis largely determine the intensity and distribution of the heat that we get from the sun. In these

particulars no other planet is circumstanced like the earth, and it follows that no other planet supports life of the same kinds that flourish here.

But not alone do some creatures respond to aquatic surroundings with scales, fins, and gills; and some to aërial surroundings with feathers, wings, and lungs; and still others to a terrestrial home, with hair, legs, and feet, but there are a myriad of variations in these responses. The camel has fitted itself for a desert life with padded feet, calloused breast and knees, protected eyes and nostrils; with a system of stomachs marvelously adapted to long activity without water, and a hump of stored-up fat for a long journey with little food. Was the camel made for the desert or by the desert? Both.

The tree that grows in the open, spreads its branches. Its trunk is relatively short and its branches broad. The same tree growing in the forest is tall, with branches far above the ground and relatively short. In each instance the tree is developing the shape that best facilitates its efforts to get light and air. The whole plan of a tree is a response to its habitat. It gets food in solution from the soil, and the tree adapts the number, length, and distribution of its roots to the kind of soil in which it lives. That it may expose the largest possible amount of surface to the light and air, the tree sends out a million leaves, broad, thin, light, and so disposed as not to shade one another to an unnecessary extent. If the tree grows far up on the mountain side, it is exposed to winds and snows. A tall tree with wide branches would invite its own ruin, so the tree on the high mountain slope grows short and gnarled and very tough, almost hugging the mountain side. Wherever the plant grows it adjusts itself to the conditions in which it must live.

The cactus lives in the arid lands. At the best it can secure but little moisture. The air and soil are dry and hot most of the year. A little rain falls and the cactus must make this little go a long way. It must contrive to hold all the moisture it can get. Leaves on plants are evaporating surfaces, so the cactus will have no leaves; it dispenses with them; its stems grow thick and massive and they branch but little. It exposes the smallest possible amount of surface to the hot sun and thus the cactus lives through the hot, dry season. It has responded to its particular environment.

Man, too, feels powerfully the influence of his physical surroundings and out of those surroundings he develops many of his traits of character. One type of man lives in the cities of the plain and

quite another type in the mountain defiles of Switzerland or Scotland. The sunny skies and soft air of Italy nourish music and poetry and art, but the rock-bound coast of Norway breeds a race of vikings. The rocky soil and the cheerless winters of New England intensified the cold philosophy of the Puritan; and the softer air and warmer suns of the South had a part in creating the gentler and finer manners of her people. The tonic force of our northern winters has not a little to do with the restless energy, the dash, and the push of northern enterprise.

A writer in this journal has pointed out that the success of the English and Americans on the sea is, in part, attributable to the superior skill attained by their seamen in the uncertain waters of the prevailing westerlies; while the disasters which have so often attended the navies of France and Spain are equally attributable to the inferior skill of their seamen, trained more largely in the belt of the trade winds, where conditions are more uniform and less trying to the sailors.

Says Professor Geikie* of the Scotch Highlander: "Placed in a glen often narrow and rocky, and separated from his neighbors in the next glens by high ranges of rugged hills, he has had to contend with a scant and stony soil and a wet, cold, uncertain climate. . . . Like his own granite hills he has grown hard and enduring, not without a tinge of melancholy suggestive of the sadness which lingers among his wind-swept glens and that hangs about the birken slopes of his lonely lakes."

It is true that man, with his superior intelligence and freedom of movement, may choose where he will live, and then, by his knowledge of the arts, he may greatly modify his natural surroundings—make a Biltmore in the mountain wilderness of North Carolina or irrigate the desert of Southern California into an orange grove or vineyard. Yet he can never get away from the influence of the skies, the soil, the climate, and the scenery amid which he lives; and when these influences have borne their ripened fruit in the settled characteristics of the people, it will be seen that a people that has lived many generations amid any set of surroundings is mentally and physically a response to those surroundings.

* *The Scenery of Scotland*, p. 436.

TRANSPORTATION

PART III

BY JOHN THOM HOLDSWORTH
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THE RAILROAD ERA

THE third great period in the history of American transportation is the railroad era. Extending from about 1830 to the present this period has witnessed one of the most striking developments in the entire history of industry. Though it covers but the span of a human lifetime, yet it has marked the working out on this continent of industrial and commercial achievement more signal, more far-reaching than that of any similar period in modern times. In these seventy years the country has grown from a few scattered states with a total population of twelve million and an annual commerce of $134,000,000 to an empire whose 80,000,000 people have spread over the entire land, pushing the railway ahead

FIG. 14. *The Conestoga wagon, the predecessor of the freight car in the Middle Atlantic States*

of them or dragging it after them, and exploiting its every resource, animal, vegetable, and mineral, until to-day the foreign commerce totals the amazing sum of $2,500,000,000, and the domestic trade almost fifteen times as much. In this great evolution no single influence or agency has contributed so much as the railway.

An English observer writing of our transportation says: "It has been a magician's wand, calling towns into existence on the naked prairie, raising towns into cities and cities into world-famous hives of wealth and industry. It has conjured up fortunes out of nothing and multiplied values ten, twenty, aye, often a hundredfold.

The cuts and maps for this article have been used by permission of D. Appleton & Co., New York, from *American Railway Transportation* by Emory R. Johnson.

Millions of well-fed, well-paid laborers enjoy its blessings without ever thinking to what they owe them. The busy factories of New England and the mammoth stores of Chicago have sprung from it as directly as the silver mines of Colorado or Nevada. The wealth-creating power of North America is to a very large extent the product of its wealth-distributing facilities. But for the capacity of the railways to carry wheat from the Missouri River to the Atlantic coast for a few cents per bushel there would have been no wheat farms west of Chicago, and many of the richest agricultural states in the Union might still have been in possession of the buffalo and the red Indian." "The railway is the best measuring-stick with which to mark the industrial advance of the American people."* The writer quoted above says further: "Not only did American railroads open up the country and lay the foundations of a prosperous agriculture, but they created directly or indirectly most of its staple industries. They furnished the best market for domestic iron and steel. They supplied cheap fuel to every industrial center. They were the principal importers of foreign labor and capital. They provided the materials for a distinctively American stock market, out of which grew in its turn an American system of finance. For years the history of the railroads was the history of the country."

The influence of the railway in the development of our vast grain fields, cotton plantations, slaughtering, mining, quarrying, and lumbering industries—in that great territorial division of industry which has given this country first place among the industrial nations of the world—may be traced most satisfactorily, perhaps, by noting the stages in our railway growth.

The history of American railroads may be divided, roughly, into four periods:

1. Construction 1830–1850
2. Consolidation 1850–1870
3. Combination 1870–1896
4. Merger or community of interest ...1896–

THE CONSTRUCTION PERIOD

The tram road was the immediate predecessor of the railroad in this country. The first of these, opened in 1826, was used for hauling stone for the Bunker Hill Monument from the Quincy granite quarries to a wharf on the Neponset River. The Mauch Chunk

* Lawson, *American Industrial Problems.*

tramway, opened in 1827, was intended for the transportation of coal. In 1828 the Delaware & Hudson Canal Company opened the Carbondale & Honesdale tramway connecting their coal mines with the D. & H. Canal. The first locomotive seen in America was imported for use on this road.

The first full-fledged railroad was the Baltimore & Ohio, a section of which, fifteen miles long, was opened in 1830. At first, horse power and even sails were used, but in 1831 the company purchased an American locomotive for its road. The system was slowly extended until in 1835 it boasted a total length of 135 miles. By 1834, however, the Charleston & Hamburg, a South Carolina road chartered in 1829, had 137 miles in operation, and for a short time enjoyed the distinction of being the longest line in the world under one man-

FIG. 15. *The stage-coach, generally used for passenger travel before the introduction of the railroad*

agement. Pennsylvania had by 1835 about 200 miles of railroad, mostly coal roads; New York, New Jersey, and Massachusetts about 100 miles each, and Virginia a few short lines. In 1836 a line, subsequently to become a part of the powerful New York Central, was opened between Albany and Utica, and six years later Buffalo was reached. Meantime lines had been extended from Boston and New York to Albany, so that railway communication was effected between the Great Lakes and the seaboard. As early as 1834 the western end of the Camden & Amboy road was opened, and in 1837 regular communication between New York and Philadelphia was established. In the same year Philadelphia and Baltimore were connected by the Philadelphia, Wilmington & Baltimore. The Philadelphia & Reading, built chiefly as a coal road, was completed in 1838. Philadelphia was connected with Columbia in 1834 by the Columbia road, the first division of what is now the great Pennsylvania Railroad System.

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New England was especially active in railway building during this period. By 1835 three lines radiated from Boston; one to Providence, another to Lowell, and a third to Worcester. The whole line from Boston to Albany was completed in 1842, and constituted the first important through route in the country. Writing of railroad construction in this period, Hadley says: "If we look at the railroad map of the United States in 1850 we find that the New England system has developed its main outlines; that the Middle and South Atlantic States have seized the idea of their lines of development, but have not as yet carried it out, while the States of the Mississippi Valley are just making their first experiments in railroad construction. In Ohio, part of the Cincinnati, Sandusky & Cleveland had been built about 1837. But it had for a long time stood alone. It was not until 1848 that through rail communication, by any route whatever, was secured from Cincinnati to the Lakes." *

The railroads of this period, then, were for the most part local affairs, carried on without any system. Each locality operated its own road. Geographically it may be noted that the railways constructed in the first ten years radiated from the leading seaports, Philadelphia, New York, Boston—Philadelphia leading as a terminal city. As shown by the accompanying table, railway mileage increased from about 30 miles in 1830 to 2,818 miles in 1840, and at the end of this period aggregated a little over 9,000 miles.

YEAR	MILEAGE	INCREASE
1830	23	.....
1835	1,098	1,075
1840	2,818	1,720
1845	4,633	1,815
1850	9,021	4,388
1855	18,374	9,353
1860	30,626	12,252
1865	35,085	4,459
1870	52,922	17,837
1875	74,096	21,174
1880	93,296	19,200
1885	128,361	35,065
1890	166,817	38,456
1895	181,065	14,248
1900	194,321	13,256

* *Railroad Transportation*, p. 36.

THE CONSOLIDATION PERIOD

The financial panic of 1837 gave a severe shock to railway enterprise and there was, consequently, a marked falling off in the annual mileage increase down to 1848. But in that year the discovery of gold in California awakened a new interest in railway construction throughout the country. During this period, too, the South and the Middle West developed rapidly, thereby creating a demand for extended and improved facilities for transportation. Railways shared in the marked prosperity of the first decade of this period.

"The year 1850 marks the beginning of a rapid welding of short connecting railroads into long lines under a single ownership." Dur-

MAP V. *Railroads in the United States in 1850*

ing this period many new lines were built, especially into the new West, and the demand for uninterrupted travel and shipment resulted in the coalition or consolidation of local lines into through routes.

Chief among these through lines were the following:

1851—Erie Railroad reached Lake Erie.

1852—Michigan Central and Michigan Southern lines opened, connecting Chicago with the East.

1854—Chicago & Rock Island pushed through to the Mississippi.

1855—Chicago & Galena, the nucleus of the Great North-Western system, opened, followed by the Chicago & Alton, the Chicago, Burlington & Quincy, and the Illinois Central.

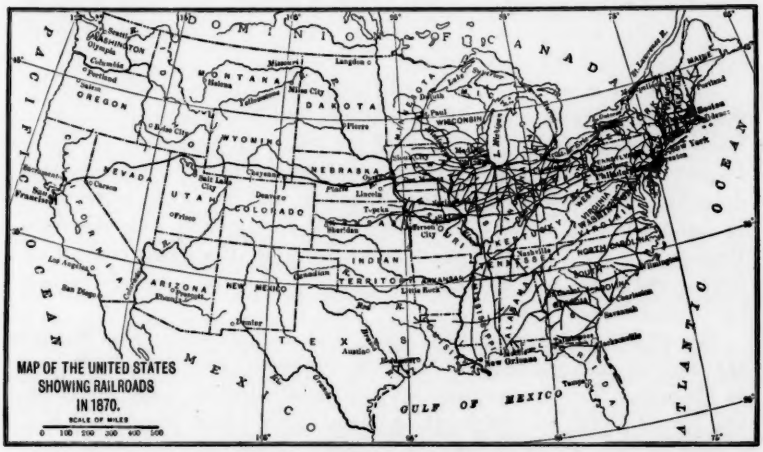
1858—The Hannibal & St. Joseph reached the Missouri River. At about the same time the Pennsylvania Railroad got through connection with Chicago by the extension of the Pittsburg, Fort Wayne & Chicago.

This rapid extension of railroads into new and sparsely settled regions was greatly stimulated by the policy of land grants. Vast areas of public lands were freely granted by State and National governments to induce corporations to undertake railway construction. This policy was followed for nearly thirty years, and was responsible for the construction of many lines in the West earlier and more rapidly than otherwise would have been the case. State aid to the railroads took various forms. Some made large grants of lands received from the National Government; some gave bonuses of cash or securities. A few states undertook the construction of railways as a state enterprise. Most often, however, assistance was given through the large purchase of railway stock.

The National Government was even more generous in its aid to railway building. In 1850 the first large grant of land from the public domain was made, the Illinois Central being the recipient. The railway corporation was given the right of way, 200 feet wide, and also alternate sections of land six miles back on each side of the road. During the next few years similar grants were made to companies in Missouri, Arkansas, Wisconsin, Iowa, Florida, Mississippi, and other states. "Eight million acres were granted under Fillmore, nineteen under Pierce."* After the Civil War, economic and military reasons alike called for a railroad to the Pacific. In 1862 Congress incorporated the Union Pacific Railroad, granting it and allied companies a money subsidy of $30,000,000 and land grants aggregating more than 30,000,000 acres, an area greater than the entire state of Pennsylvania. Congress made grants to over twenty companies during the next ten years. The Atchison, Topeka & Santa Fe received 3,000,000 acres in 1863, and a little later the Atlantic & Pacific received a grant of 42,000,000 acres. An almost equal grant was made to the Northern Pacific, and large grants to the Texas & Pacific and the Southern Pacific. Up to 1871 these grants from the public domain amounted to about 150,000,000 acres. Parts of these lands have reverted to the United States through the failure of the companies to comply with the conditions of the grant. Professor Johnson, summing up the policy of land grants, says: "Unquestion-

* Hadley, p. 37.

ably the United States was more liberal than it need have been, and if the public had chosen to wait twenty years the railroads in the Central West and between the Mississippi Valley and the Pacific Ocean would have been constructed by private capital. The liberal donations of public land caused the railroads in that section of the country to be built earlier than they would otherwise have been constructed, the West was settled up more quickly, and the Government has been able to dispose of many parts of the domain it did not give away at an earlier date, and possibly more advantageously than they could have been sold had none of the land been given to the railroad corporations."* Thus rapidly railroads were developed in the upper



MAP VI. *Railroads in the United States in 1870*

Mississippi Valley, particularly in the five years following 1868. The crisis of 1873 checked railway expansion everywhere, but with the revival of business the Southwest and Rocky Mountain regions experienced a similar development. The increase in four years of the mileage in the southwestern states was 168 per cent as compared with an increase of only 24 per cent east of the Mississippi.

While these transcontinental routes, backed by land grants, subsidies, and local subscriptions, were being pushed across the plains and over the mountains, the earlier roads of the East were slowly being shaped by consolidation into a few great trunk lines. This

* *American Railway Transportation*, p. 318.

process of welding short, local roads into through lines had become an economic necessity. As through traffic, and particularly the through grain trade, steadily increased, the expense and delay of frequent transshipments made consolidation imperative. The first consolidation of importance was in 1853, when eleven different roads between Albany and Buffalo were united to form the New York Central. Gradually the system thus formed acquired control of numerous branch lines. In 1869 Cornelius Vanderbilt, who had foreseen the great future of this road and had become its dominating genius, consolidated the Hudson River Road and the New York Central, and soon afterward gained control of the Lake Shore & Michigan Southern, the Michigan Central, the Canada Southern, and other roads, thus uniting under one management over 4,000 miles of railroad between New York and Chicago.

The nucleus of the present Pennsylvania System was made by similar consolidations carried out largely by Thomas A. Scott, who became vice-president of the road in 1860 and president in 1874. During the twenty years of his executive service the system was extended westward to Cincinnati, Chicago, and St. Louis, northward to Lake Ontario, eastward through New Jersey, and southward to Baltimore. By the absorption of other lines it gained control of over 7,000 miles of railroad, comprising properties formerly owned by over 200 companies.

By 1874 a third great trunk line, the Baltimore & Ohio, under the skillful management of John W. Garrett, had been extended to Chicago. Two more trunk lines, parallel to these, soon followed: the Grand Trunk on the north, and the Erie, which Vanderbilt had sought in vain to bring into his system. Thus by 1874 there were five great trunk systems actively competing for the growing business between the Mississippi Valley and the Atlantic ports.

Toward the end of this period great rival systems were developed west of Chicago and St. Louis. These systems, instead of running parallel like the great trunk lines of the East, radiate from common centers, reaching out in all directions for the grain and other produce to be brought in to the primary markets. Thus from Chicago radiate the St. Paul, the North-Western, the Rock Island, the Chicago, Burlington & Quincy, the Atchison, Topeka & Santa Fe, the Chicago & Alton, and the Illinois Central. The railway net about St. Louis shows a similar radiation.

(*To be continued.*)

WHAT A CHILD SHOULD GAIN FROM GEOGRAPHY

BY R. P. IRELAND
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ANY answer to the question, "What is essential in geography?" or "How much geography should a pupil know at the end of his course? must be viewed rather as a shot at a moving target and not as an attempt to put a fence about a particularly fertile bit of ground. The needs of pupils another year and at another place are sure to differ from their needs here and now. Diplomatic relations, inventions, explorations, and feats of engineering are some of the factors which are sure to place a new emphasis on some product, place, or people.

At the outset nearly all of the ordinary facts of geography must be examined and their importance rigidly questioned. I say *nearly* all, because it is hardly open to question that the continents, the oceans, a few mountain and river systems, most European countries, and half a dozen great cities are indispensable facts. The rivers of Siberia, the tunnels through the Alps, the tides in the Bay of Fundy, and the capitals of several countries are examples of various classes of facts whose worth may be questioned.

Then we may proceed *according to time and place* to select much that is unessential and discard it. Thus the fact that Newfoundland is a crown colony, *distinct from Canada*, is of vital importance to this city (Gloucester, Mass.), but it would be of no particular value in many sections. Whatever tends to show the "causal relation," the reasonableness of things, is generally worth while. Many children may prefer memorizing a list of products, for example, to inferring what should be produced under given conditions, but this cannot be considered. The matter has too much bearing upon their happiness and usefulness in adult years to be decided upon such a basis.

Pupils can hardly be grounded too thoroughly in home geography. This should include such diverse facts as the differences in the vegetation of various parts of near-by fields and pastures, and the relation between the primary and secondary industries of the town. It should include to a considerable extent the sources of the commodities used in the town as well as the destinations of those produced. Enough physiography should be given that the present appearance of local

features may be understood. The progress of minor changes, such as the variations in ponds and brooks or the sliding of a boulder or a tree down a bank, should by no means be omitted. When more distant regions are considered, less detailed study is possible, but there shouid be nothing magical or capricious about the phenomena of foreign lands. Certain books of travel and some teachers seek to interest children by conveying the impression that in China or Australia everything in nature is topsy-turvy. This is entertaining, but it adds nothing to scholarship. The "wonders" of foreign lands are frequently only larger examples of local features. The hackneyed statement concerning the leaves of certain Australian trees is brought to an everyday basis by observing the behavior of corn leaves and some others in time of drought. Unless some such association can be made there is little use in alluding to the feature at all.

Mathematical geography need be considered only so far as it is required for use in other parts of the subject. A true conception of much of it is unattainable even to adults, but a working knowledge of certain features may be acquired. This, plus the ability to avoid confusing such points as the cause of the change of season with the cause of day and night, is about all that is needed. In some cases where the cause as a whole cannot be understood certain surface observations may be used. Thus it is easily seen that the sun's path from the eastern horizon to the western horizon is shorter in winter and longer in summer. Most children have learned in some form that there are astonishingly long periods of light and darkness and of daylight at the poles. Using this, a fairly correct inference may be made as to the length of day and night at such points as Montreal or St. Petersburg. With regard to latitude and longitude the most important point is that pupils should distinguish one from the other, and the next point is that a given reading should suggest some position on the earth or, what is more likely, on a globe. This association will not occur unless the use of the globe is habitual in the class room.

Just how much political geography is requisite is the hardest part of our question. Certainly no question relating to a geography course has been so poorly answered at times. The number of geographic names held, ready for use, by the average well-educated adult is probably much less than is commonly supposed. To test this let almost any two teachers whose work for a few years has concerned different continents give each other a fairly sharp quiz.

As indicated in the commencement of this article a few facts may be put in a favored class, but most must be rigidly questioned and good reason found for including them. Most countries may be included without question, but Montenegro, Guatemala, etc., might be overlooked without loss. A few years ago Korea or Abyssinia might have been left out. National capitals may be divided in a similar manner. The burden of memorizing state capitals should be dropped as that of state boundaries has been. The amount of possible interest a place has for a pupil will determine in many cases whether it is to be studied or not, even though the interesting feature may not be of great importance to adult minds. It ought to be unnecessary to suggest here that the possession of a city charter does not increase the importance of a place in a geography course.

As we reach places of historic importance I believe we should do more than is generally done. Brief accounts of some of the more important events of foreign history may well be included. Warren Hastings and Lord Clive will interest, as Cortez and Pizarro do. The stories of the Roman and the Mohammedan conquests of Europe are decidedly worth while. Such terms as Finn, Syrian, Bohemian, a large number in all, are in everyday use, yet ordinarily neither map nor text sheds much light on their meaning. This omission should be remedied.

In the foregoing paragraphs I have suggested not so much what a pupil should know as what standards should guide the teacher in selecting work for him. Our most urgent work as framers of a course lies rather in bringing the facts into close relation to the pupil's life rather than in the selection of facts.

WHAT THE CHILD SHOULD KNOW OF GEOGRAPHY AT THE END OF HIS GRADE COURSE

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PLACE. Geography is pre-eminently a place study. Place involves direction and distance. The child should know the use of the terms right, left, nearer, and farther. He should know how to determine actual directions by the aid of noon shadows, the North Star, and the mariner's compass; and to determine represented directions by the aid of parallels and meridians. He should know how to determine actual distances in units of linear measure, and represented distances in units of angular measure, which units he should readily translate into more familiar units of linear measure. He should know that a line drawn longitudinally through the center of a noon shadow is a part of the meridian of the object that casts the shadow; that a line drawn at right angles to the meridian and through the center of the base of the object casting the shadow is a part of the parallel of that object; and that the exact number of this parallel may be known by determining the height (in degrees) of the North Star above the horizon as seen by an observer on this parallel. He should be able to estimate distances in units of time, according to the means of travel, whether express train, trolley car, carriage, steamship, etc. He should be able to make a practical use of his *place* knowledge, when occasion requires, by giving and receiving clear and exact information regarding the location of streets, roads, and buildings of his neighborhood; the location of the towns of his county; the counties of his state; the states of his country; and the principal countries of the world. He should know the location of the cities of his state, of the great cities of the world, of important land and water forms, and of the noted pleasure and health resorts, and for what these resorts are noted.

GOVERNMENT

The child early learns that he is under the control and protection of government,—government of home, school, and society. He learns that the boundaries of his district are political boundaries, and that certain district officers control the district schools. A

knowledge of municipal and town government follows; and later, a knowledge of state and national control. The child should know that public highways and bridges are constructed and maintained by government; that canals, chartered corporations, penal institutions, boards of health, and public charities are under governmental control. He should know that his government constructs, maintains, and controls the harbors, harbor lights, breakwaters, life-saving stations, weather bureaus, custom houses, and post offices of his country, and he should know the relation which all these bear to the commerce of his country. He should know the various kinds of national governments, and that that government is the best government that is "of the people, by the people, and for the people."

EARTH FORMS

The earth is composed of land, water, and atmosphere. Each of these earth elements contains portions of the other two. Each is influenced by the others. All are necessary for the existence of plant, animal, and man. Hence the child should know the hills and meadows, the streams and ponds, and the atmospheric phenomena of his neighborhood. He should know the relation of hill and meadow to the run-off, to ground water, and to evaporation; he should know the relation of the streams and ponds to drainage; the relation of winds to rainfall, and of rainfall to vegetation. He should know what soil is, how to tell the different kinds of soil, and the relative capacity each kind of soil has for heat and moisture. He should know what soil is best adapted for each crop raised in the near-by fields, the time of sowing and harvesting, and the use made of each crop. He should know the relation of local relief to the use of farming implements and machines, as well as to the different modes of transportation. He should understand map representation of relief, drainage, soil, rainfall, temperature, winds, land and water transportation routes, latitude and longitude. From given data he should be able to make intelligent deductions regarding the industries of a given place.

THE THREE KINGDOMS OF MATTER

The child should know that all matter can be grouped under three heads, namely: animal, vegetable, and mineral. He should be able to catalogue under these three heads all substances with which he comes in contact. He should know from what kingdom each article of his food comes, each article of his dress, of the furniture of his

room, and each part of the house that shelters him from the weather. He should know the relation of each kingdom to each of the others.

THE EARTH AS A PLANET

The child should know the shape of the earth, the size, the motions, and its relation to the sun and moon. While none of this is geography, it all has a direct bearing on geography. He should know of what the surface of the earth is composed, the relative amounts of land and water, and what the effect upon life would be if these relative amounts should be greatly changed.

COMMERCE

The child early learns that if he prefers a ball to the knife he owns, and his playfellow prefers a knife to the ball which he owns, that each may satisfy his want by making an exchange. Or the child may have a handful of marbles but no top; his playfellow may have two tops but no marbles; an exchange of a part of the marbles for one of the tops will satisfy a want of each.

He knows that farm produce is taken to the city and exchanged for sugar, coffee, cotton cloth, nails, etc.; that strawberries are exchanged for bananas, and apples for oranges.

He should know why rice is not grown in New York, cotton in Illinois, and wheat in Florida. He should know the importance of these products, the conditions which favor their growth, and the great demand for them; and that where they can be grown successfully there they will be grown. He should know that only a comparatively small area of the continents is adapted for the growth of each, and that each product is needed throughout the extent of every continent; hence the need of extensive cultivation, and of means of communication and transportation.

He should know that the increase in population and the advancement in civilization demand a greater quantity and better quality of food and shelter materials; that the demand calls for improved machines; and that improved machines and manufacture call for the exercise of inventive power and skilled labor.

The child should know what states of his own country and what countries of the world lead in the principal productions of food and shelter commodities. He should know where the great centers of industry are and why they are there. He should know where are the great shipping and receiving ports, where are the great commercial routes on land and on sea. He should know what irrigation is and

its use, from his own kitchen garden to the great systems of the West, of India, and of Egypt. He should know the relation of irrigation to commerce.

SOURCES OF INFORMATION

The child should know the use of his text-book on geography: the use of the pictures, the diagrams, the various kinds of maps (not political only), the text, and the pronouncing vocabulary. He should know the use of the gazetteer, the dictionary, the encyclopædia, the topical index of standard works of reference, and the card catalogue of his school library. He should know how to use these sources of information that he may read the daily paper and current literature with interest and with profit. The intelligent use of sources of information should develop the reading habit, and make the study of geography lifelong.

GEOGRAPHICAL NOTES

Geographic Features of Alaska.—An examination of a chart of the world will show that the latitude of Alaska corresponds approximately to that of the Scandinavian Peninsula. Point Barrow, the northernmost cape of Alaska, is in about the same latitude as North Cape. Dixon Entrance, which marks the southernmost point, is nearly on the same parallel as Copenhagen. Sitka, the capital of Alaska, is in the latitude of Edinburgh, in Scotland.

To consider the longitude, the meridian passing through the most western of the Aleutian Islands passes near the New Hebrides and through New Zealand. Cape Prince of Wales, the most westerly point of the mainland, is nearly as far west as the Samoa Islands.

Alaska stretches through 27 degrees of latitude and 54 of longitude. Its east and west dimensions, measured to the extreme limit of the Aleutian Islands, is almost exactly equal to the distance from Savannah on the Atlantic coast to Los Angeles on the Pacific. Its most northerly and southerly points are as far apart as the northern and southern boundaries of the United States.

Alaska, the northwestern extremity of the North American continent, forms in its main mass a peninsula nearly rectangular in outline, cut off from the continent by Mackenzie Bay on the north and the Gulf of Alaska on the south. South of it lies the Pacific Ocean.

On the west it is bounded by Bering Sea and Bering Strait and west and north by the Arctic Ocean.

The territory is extended west and southwest by its two peninsulas of considerable size—the Seward Peninsula, with which the Chukchee Peninsula divides Bering Sea from the Arctic Ocean, and the Alaskan Peninsula, which, continued in its archipelagoes, the Aleutian Islands and Commander Islands, cuts off Bering Sea from the Pacific Ocean. The coast of Alaska is of two distinct topographic types. Northward from the Alaskan Peninsula shallow-water conditions usually prevail, the coast line is very regular, and the land slopes gently from the shore. Eastward and southward from the Alaskan Peninsula the shores are usually abrupt, with many embayments and islands. This Pacific coast region is included in the glaciated area of Alaska, while along the western and northern coasts glaciation is either entirely absent or only of local character.

The Pacific coast line forms a deep reëntrant angle, which is occupied by the Gulf of Alaska. It is bounded on the east by the Panhandle of the territory, usually called Southeastern Alaska, and on the west by the Alaskan Peninsula. It will be shown that the axis of the dominant mountain chains undergo, too, a marked change in direction, and are parallel to the crescent-like bend of the southern coast line. A study of the geology goes to show that this is the topographic reflection of an important structural feature.

A clear conception of the main features of the topography of Alaska can be obtained by comparing them with those of the western United States. A broad mountainous belt, called by Major Powell the Pacific Mountains, including the Coast Ranges of California, Oregon, and Washington, the Sierra Nevada and the Cascade Mountains, extends along the western margin of the United States and is continued by other ranges northward into Canada. East of this lies the Great Basin or Central Plateau region, which also finds its counterpart in British Columbia to the north. The eastern limit of the plateau region is marked by the Rocky Mountains, which again, like the western Pacific Mountains, extend into Canada. To the east of these the Great Plains extend northward to Arctic waters.

Dr. George M. Dawson and others have shown that these four topographic provinces of the United States, which are fairly well defined throughout western Canada, find their continuation in similar geographic features in Alaska. The general trend of the highlands in Alaska, as in the United States and Canada, is parallel to the coast

line. Attention has already been called to the great southwest bend of the Alaskan shore line near latitude 60. The orographic features of the mainland experience a similar change in direction, continuing parallel to the shore line.

Alaska is thus divisible into the same four geographic provinces as those of western Canada and the United States. The lines of demarkation between these provinces are usually sharply drawn. Each is of a predominant topographic type, though each may be subject to many minor topographic subdivisions.

A mountainous belt skirting the Pacific coast of Alaska and British Columbia, extending inland from 50 to 200 miles, forms the most western of the four provinces, which, in conformity with Major Powell's classification, I will call the Pacific Mountain system. It properly includes the mountainous Alexander Archipelago and Aleutian Islands, and a number of other island groups which lie adjacent to the coast. The Pacific Mountains belt is made up of four distinct ranges: The Coast, St. Elias, Alaskan, and Aleutian. These are often separated by broad valleys or indentations of the coast line, and while the topography of the system is mainly rugged and mountainous, it includes several large basins, like that of the Copper River.

East and north of the Pacific Mountains is the Central Plateau region, limited on the north and east by the Rocky Mountains, corresponding with the Great Basin region of the western United States. The term plateau can only be assigned to a part of this province, and not even that by strictest usage. Its dominating topography is a gently rolling upland of low relief, compared with the mountain systems, in which the rivers have trenched broad channels. The inter-stream areas mark a former plateau surface, which the erosive agents have dissected. This plain slopes gently toward the axis of the basin, and the axis is tilted to the north and west. Its surface is interrupted by a number of mountains and mountain groups, which rise above the general level. Within this belt are also a number of lowland areas of considerable extent, which lie below the upland surface. Among these the flat of the middle Yukon is notable. The lowlands which extend along Bering Sea adjacent to the Kuskokwim and Yukon rivers are included in this province.

To the east and north is a broad mountain system but little explored, which forms the third of the geographic provinces. It is, as has been shown, the northern extension of the Rockies. These, like the Pacific Mountains, also undergo a marked change in direction.

Trending northwestward from the United States and Canada, they swing to the southwest at the Arctic shore, which they touch again north of Bering Strait. The system is represented in Alaska by the Endicott Mountains, and probably by several other ranges as yet unsurveyed.

The fourth province is that of the plains lying east of the Rockies, which in Alaska is represented by the Arctic Slope region, lying between the western extension of the Rockies and the Arctic Ocean. This province, like that of the western United States, is really a slightly elevated plateau, dissected and more or less rolling, which slopes to the north from the foothills of the Rocky Mountains. A featureless coastal plain, of varying width, separates the northern boundary of the plateau, which is marked by a scarp, from the Arctic Ocean.

About one-fifth of the drainage of Alaska is toward the Pacific Ocean, nearly one-half toward the Bering Sea, and the rest toward the Arctic Ocean.

The map shows the Yukon to be the master stream, and the outlines of its basin correspond in a general way with the boundaries of the Central Plateau province. The headwaters of this mighty river, the fifth in size of the North American continent, lie in British Columbia far to the southeast of Alaska, where they fight for mastery on one hand with the water courses flowing into the Pacific and on the other with those belonging to the Mackenzie drainage basin, flowing into the Arctic Ocean. The general course of the upper Yukon and its tributaries is northwest as far as the Arctic Circle. It then makes a great southwest bend and pours its great volume of muddy waters into Bering Sea, nearly 3,000 miles from the source of its longest tributaries. The valley of the Yukon occupies the medial line of the plateau province, and with it makes the same great bend to the southwest parallel to the swing of the two mountain systems to the north and south. The relief, which is measured by the altitude of the remnants of the plateau above the floor of the valley, is greatest near the international boundary and decreases both above and below. A narrow valley characterizes the upper Yukon proper, which broadens out at the so-called Yukon Flats, near the big bend, and contracts again below in the Ramparts, and then broadens out below the mouth of the Tanana.

The northern and eastern limits of the catchment basin are generally defined by the crest line of the inland frontal ranges of the

Rocky Mountain system, but this does not always hold true, for the Peel River, a tributary of the Mackenzie, has its source west of the Rockies. On the other hand, the Macmillan River finds outlet in the Yukon drainage after traversing one of the ranges of the Rocky Mountain system. The southern and eastern divide of the Yukon basin is even of greater irregularity. On one hand some of its tributaries find their sources to the south of the ranges of the Pacific Mountain system, and on the other a number of large rivers emptying into the Pacific have their headwaters inland of this barrier.

The Yukon River forms the great natural highway of Alaska. In summer 3,000 miles or more of navigable waters are found within its basin, and in winter the frozen surface of the river affords a route of travel for dog teams. It was along the rivers that the pioneer could best journey, for on his crude rafts or boats, built of the timber which grew on the banks, he could transport necessary supplies, and later the steamboat succeeded to that propelled by hand.

The Kuskokwim, flowing into Bering Sea, is second only to the Yukon among Alaskan rivers, and includes probably upward of 1,000 miles of waters which are navigable for steamers. Its basin lies west of the Alaskan range and entirely within the plateau province.

The Pacific drainage embraces two classes of rivers: First, those whose catchment basins lie entirely within the coastal zone of mountains, and second, those whose courses reach into the interior region and traverse the mountains on their way to the sea. Of the first the Sushitna and Copper, and of the second the Alsek, Taku, and Stikine are the most prominent examples.

The Arctic Ocean receives the waters of a small part of the plateau provinces through short rivers draining the northern part of the Seward Peninsula and some larger ones flowing into Kotzebue Sound. Much of the larger part of the Arctic drainage consists of that received from the interior valleys of the Rocky Mountain ranges and from their northern slopes. Under the former are comprised the drainage basins of the Noatak and the Kobuk, both streams including navigable waters which are bounded both north and south by the mountains of the northern system. The second class of waterways includes the northerly flowing streams which receive the drainage from the seaward slope of the Rockies. The Colville, the largest of these streams, properly belongs to both classes, for its source lies well within the front ranges, which it traverses in a narrow valley,

and it also receives a large amount of drainage from the northern slope of the Rocky Mountains.—*National Geographic Magazine*, May, 1904.

A Great Tunnel.—During the life of the present generation the Alps have been pierced four times by tunnels, the latest of these being the greatest of them, the tunnel under the Simplon Pass. Work on this great enterprise began in 1898, and a French geographical journal, quoted by the New York *Sun*, announces that on the fourth day of May the Swiss and Italian workmen, who have been approaching one another from the opposite ends of the tunnel, knocked down the slight barrier of rock which still separated them. The Jura-Simplon Company agreed to have the tunnel ready for use in five and a half years. They have spared neither time, money, nor skill in the endeavor to fulfill their contract, but the difficulties they have met have been enormous, and the Swiss Government, rightly taking these difficulties into account, has extended the time for the completion of the tunnel to April 30, 1905, and has given the company a supplementary credit, increasing the payment for the tunnel from $14,000,000 to $15,600,000. The first of these great Alpine tunnels in point of time was the Mont Cenis tunnel in France, which is nearly eight miles long and was fourteen years in construction, being finished thirty-four years ago. Next came the St. Gothard, nine and a quarter miles long, which was nine and a half years in construction, and was completed twenty-four years ago. Then came the Arlberg, six and a half miles long, three and a half years in building, and completed twenty-one years ago. The Simplon is twelve and a half miles long, its greatest altitude above the level of the sea being 2,314 feet, while the altitude of Mont Cenis is 4,248 feet. The work has been done, as all work of the kind is done on the continent, with artistic completeness. The station at Brieg was finished some time ago and is an admirable structure. The valley which approaches the tunnel from the Italian side was one of the most beautiful in northern Italy, but has been hopelessly scarred by excavations, cuts through the rock, and the litter and disfigurement attendant upon railroad building, to say nothing of a great village of Italian workingmen which has grown up near the entrance to the tunnel. This entrance is approached by a series of smaller tunnels which extend all the way from Lake Maggiore. The greatest obstacles which the enterprise has been compelled to meet have been water and heat. During the first three months of 1902 the work on the Italian end

advanced only fifty feet, so many were the springs that were met and so great was the volume of water which had to be cared for. The heat has been in many places prostrating, the temperature ranging from 95 to 107 degrees. It was necessary to shorten the hours of work and to provide buildings with facilities for hot and cold baths, so that when the miners came out of the tunnel they should not be at once exposed to the keen Alpine air. The completion of this tunnel will give direct communication between Milan and Paris and London and points all the way to Brindisi. The Mont Cenis furnishes the shortest and quickest route from France and northwestern Europe to Genoa. The chief route between Central Europe and Italy is that through the St. Gothard, and travel from Paris and Genoa to Austria passes largely through the Arlberg. With the completion of the Simplon tunnel the Alps have been practically annihilated for purposes of travel and traffic. — *The Outlook*, June 11, 1904.

British India.—*Agricultural Conditions.*—The peninsula of India, which in area is about one-half the size of the United States, has a population of nearly 300,000,000, about 200,000,000 of whom depend, directly or indirectly, for a livelihood on agricultural employment.

The area of the holdings is on an average exceedingly small, seldom more than a few acres and often mere gardens. Of course there are some exceptions, Zemindars and a favored few having larger holdings.

The holdings are held by different kinds of tenures, generally leasehold; seldom in fee simple. The fee being, as is the case in the presidency of Bombay, in the government, the tenant is not permitted to alienate or encumber his title.

The farmer of India, or "ryot," as he is called, is in utter darkness as regards education, and is poor and underfed. He is industrious and, under the circumstances, outside of famine years gets good returns from the soil. He lacks ambition or desire to improve his material condition or methods of labor. He cuts his crops according to the signs of the moon or the custom practiced by his forefathers. Oftentimes the grain is overripe, and grass or fodder has lost its nutriment and turned to straw on the stock before it is harvested. The system of timely cutting and curing grass and fodder is quite unknown to him.

He has little knowledge of green manures. Much of the excrement of the bullocks is used for smearing walls and ground floors of their houses and for making cakes for fuel.

Life in the villages has been modified but little since the most ancient times. All ryots, or farmers, live in villages, and to them one must go to understand the life of the Hindoo.

Hand Labor vs. Machinery.—Farm labor is plentiful and cheap, and is paid from 2 to 4 annas (4 to 8 cents) per day. The farm is so small and the ryot so poor—taxes and famine years claiming all his savings—that he is generally in debt to the money lender for marriage ceremonies for his children or memorial celebrations to his ancestors.

Agricultural Implements in Use.—The agricultural implements used by the ryot are of the most primitive and ancient patterns. Hand sickles are universally used to cut the crops; grain cradles are never and scythes seldom seen in India.

The grain is thrashed by pounding with a club or tramping by cattle, and winnowed by being tossed in the air so that the wind may blow out the chaff.

With a few exceptions in large cities, the grinding of grain is done by women on hand mills, after the manner shown in Biblical pictures of the time of Abraham.

The plow consists of an upright piece, made from a curved limb of a babul tree, with an iron point, having mortised into it a beam lengthening into a tongue, and which is tied by a rope on the yoke of the oxen. The plow is made by the village carpenter, at a cost of 3 or 4 rupees ($1 or $1.30). The plow is drawn by one or two yoke of oxen, and it simply stirs the ground. The monsoon rains do the rest.

Water is drawn from wells for irrigation purposes by bullocks pulling down an incline. The water is raised in leather bags, connected to the ox yoke by a rope running over a pulley.

An implement universally in use on the farm and generally for all sorts of digging, scraping, and raising of dirt is the "pharwa." It is somewhat similar to the hoe; the blade, however, is broader, thicker, and deeper. It is hammered out by the village blacksmith, and has a short, straight handle.

If earth is to be moved any distance it is dug up by the pharwa and scraped into a shallow, round, bamboo basket, which is then placed on the head of a coolie "woman," who carries it to place or dumps it into a bullock cart.

Spades are not in use because the native, being barefooted, cannot press it into the ground. Shovels, which require more strength

to shove them than to pull the pharwa, are likewise never used by the native.

How to Increase American Trade.—Under the foregoing conditions we cannot expect to sell in India mowers, reapers, binders, steam separators, gang plows, and such agricultural machinery as prove of great value on an American thousand-acre farm.

There is, however, no doubt but that there is a considerable opening for hand machinery, farming implements, and other labor-saving devices, such as hand fanning-mills, cheap plows, ox yokes, dump carts, horse powers, feed or fodder cutters, small thrashing machines, carriages, cultivators, cane mills, oil engines, belting, iron hand-pumps, brick machinery, grindstones, sickles, wind-mills, pumps and towers, carpenters' tools, safes, hardware, electrical supplies, and cotton machinery.

Roads, Animals, and Vehicles.—The main highways and city streets are well made, usually of macadam, thoroughly drained, and rolled by heavy steam rollers imported from England. Famine labor has been utilized in their making. India, being tropical, is never disturbed by the upheaval process of frosts and ice.

The vehicle of transportation is the bullock cart. It is native-made, simple, heavy, and clumsy. The tongue is mortised into the axle, and upon this T the rack or box is permanently fastened; the end of the tongue is bound stiffly to the ox yoke. The latter is a simple, round piece of timber three or four inches thick and about four feet long. It rests on the neck of the bullock, wooden or iron pins being run through its ends to keep it from slipping off the neck of the animal. The load on the cart is balanced so that the yoke is held down, and a rope around the neck of the ox takes the place of an oxbow and keeps the cart from tipping backward. The cart is dumped by simply unfastening the rope around the neck of the oxen.

The oxen, being of the high-hump, sacred variety, are peculiarly fitted for this barbarous yoke, which conveys every motion and jolt of the cart to the neck of the oxen. A Yankee ox-yoke would be a blessing to these dumb brutes, and at the same time it would increase their efficiency. These ox carts, or "bail-ghari," are universally used in the cities as well as in the country for all kinds of draying and hauling grain, hay, dirt, brick, stone, bales of cotton, steel constructional beams, or teakwood logs forty feet in length; everything and anything is carried upon them.

The native "reckla," or covered two-wheeled cart, drawn by trot-

ting oxen, is much in use in the cities for the transportation of natives. In the cities a "victoria," or "ticca-ghari," drawn by one horse, is generally used by the Europeans and better class of natives as a hired street conveyance. It is native-made, the springs, axles, and, perhaps, some other parts being imported from England. In Bombay it is fitted with rubber tires and forms a convenient and cheap mode of street conveyance.

In the country and interior towns the conveyance for Europeans is the "tonga," a two-wheeled cart with a seat facing the rear for two persons, who ride with back to the driver. They are drawn by two small native horses, with a kind of yoke fastened on the back or neck. The European in India generally supplies himself with a fine victoria imported from England. It is drawn by a span of Persian or Australian horses.—*Monthly Consular Reports*, December, 1903.

The Practical Use of the Globe in Teaching Geography.—I propose to describe a series of lessons that I have given during the last term to a form of boys whose average age is fourteen years. If the illustrations that follow appear to you to be exceedingly elementary and self-evident, please remember that the whole object of this paper is to show how these elementary ideas may be arrived at in a practical way, and to indicate briefly the method adopted in the course of lessons I have mentioned. I did not therefore deal with those abstruse mathematical calculations which are so dear to the hearts of mathematical masters, but confined myself to those broad principles which are so necessary,

I need hardly point out the necessity of constantly using a globe in geographical teaching. Some people still ask with surprise whether we wish to revert to the system of the old-fashioned ladies' school, in which "deportment and the use of the globes" figured as important items on the prospectus. Mediæval pedants are always depicted with a globe, but in recent times globes have almost disappeared from our schools. This is very remarkable and perhaps can only be accounted for by the great improvement that has taken place in the production of wall maps and atlases. The excellence and cheapness of maps account perhaps for their almost universal use, while the greater cost of globes and the difficulty of using them with large classes tend to make globes less popular. Geography is a subject peculiarly suited to the training of the powers of observation and imagination. How can we expect a boy to realize that the parts of the earth he is studying are curved surfaces when we constantly

put them before him as flat surfaces? It is of little use to ask a question occasionally in an examination paper (perhaps once a term or once a year) as to the shape of the earth, and then to ignore the subject as if it had nothing to do with the work of ordinary geography lessons. What is absolutely necessary is to have a globe always in view so that it may be constantly referred to. Any kind of globe is, of course, better than none, but the most useful kind, and the one which I myself use, is a globe with a slate surface on which the outlines of the continents only are marked in white paint, while the circles of latitude and longitude, at intervals of 15°, the tropics and the Arctic circles, are incised. This globe, twenty inches in diameter an mounted with the axis inclined, was made by Messrs. Philip & Son of Gleet Street, and is excellently adapted for the lessons described in this paper. Each lesson was studied with the globe at considerable length, the boys having to observe and find out as much as possible for themselves; no text-books were used, but after each lesson a description of the work was written out and, where possible, diagrams were drawn. I am very anxious that the method that was followed should be clearly understood, because I am obliged to introduce, as I go along, much that was only taken at the end of the term when revising what had been done. No lantern slides were shown, except for purposes of revision at the end of the course.

In the first lesson the boys examined the globe and noted such facts as the following: (*a*) That all the lines drawn on the globe are circles. (*b*) That the equator and all circles passing through the poles divide the globe into hemispheres. (*c*) That all the other circles divide the globe into unequal parts. (*d*) That the land masses are nearly all north of the equator.

In the next place, taking an unmarked globe to represent the earth, we found that the position of the poles depended on the axis of rotation. On being asked how the axis of rotation should be inclined, boys are generally ready to reply: "At an angle of 23½° to the vertical," instead of to the vertical to the plane of the earth's orbit. Simpler than this is to point the axis toward the north polestar. Here one naturally asks: "How can the position of the north pole be found on a starlight night?" Many boys when asked do not know at all, and of those who can sketch the seven stars in the constellation of the Great Bear very few have ever actually seen the constellation. One boy who said he had seen it explained the position as, "Above the left-hand fence of our back garden." He had so

far never realized that he had been looking toward the north, while at the same time he showed a lamentable lack of power to describe what he had seen in a definite and intelligent way.

We now drew a circle around the globe midway between the poles to represent the equator. If a place is 40° north of the equator it must lie somewhere on a circle; but this is all we know, unless we are further told its distance east or west of a given circle passing through the poles. Hence the following facts: (*a*) That the equator and the prime meridian are the only circles necessary to determine positions. (*b*) That all other circles are drawn on globes simply for convenience in measuring positions. (*c*) That all these circles depend on the rotation of the globe. Here, then, follow exercises in finding positions on the globe when the latitude and longitude are known, reading the latitude and longitude of a given place, finding the difference of time at given places, and so on. The boys take great interest in doing this; in fact, they will often practice by themselves, and, if the class is small, it is always possible to let them stand round the globe and do these exercises, with very satisfactory results.

In order to fix the cardinal points in the class room, the boys themselves should find the north-south line by means of equal altitudes of the sun from the shadow of a stick, and then draw this line on the floor of the class room. The determination of this line took us a fortnight to accomplish; that is, we began and tried day after day for a fortnight. We then got a magnetized needle and found the direction of the magnetic north, and on measuring the angle between this direction and the geographical north, it was found to be about 15°, a sufficiently accurate result for 1903.

The globe was then placed so that its axis was pointing toward the north polestar, and it was decided that the globe must be revolved from west to east, and never from east to west. The room having been darkened, the light of a small lantern was next turned on to the globe, and it was seen that the line dividing the dark from the light side was a vertical circle. On revolving the globe, the phenomena of sunrise, sunset, meridian altitude of the sun, etc., were roughly demonstrated, and after this diagrams were drawn to show the length of day and night throughout the year for any latitude. Having drawn a series of diagrams for various latitudes, we at last came to 90° N., and, while drawing the figure in the usual way, viz., observer in center, horizon, N., S., E., W. points, and so on, one boy suggested that in this case these points might be omitted on the ground

that an observer of the north pole would be looking south in whatever direction he turned.

By holding the axis of the globe vertical and allowing the light of the lantern to fall directly on the equator and carrying the globe round the light, it is at once seen that under these conditions the sun would be always vertical on the equator, and the days and nights would be equal throughout the year. But from experience we know that the sun is only vertical on the equator twice a year; that it is vertical over places 23½° N. on June 21st, and over places 23½° S. on December 22d, and that the length of day and night varies throughout the year. To account for these phenomena it is necessary to incline the axis 66½° to the plane of the ecliptic. Having placed the globe with the north pole turned away from the light, and having noted the northernmost point reached by the light, we turned the globe around and found that we had traced a circle, viz., the Arctic Circle, and that in this position all places within it were in darkness. Similarly, all places within the Antarctic Circle were illuminated. As the globe was moved round the lantern through an angle of 90° the light was seen to creep gradually into the Arctic Circle and to reach the north pole, while the direct rays of light were at that moment vertical on the equator. Similar observations were made as the globe was slowly moved into other positions in its course round the illuminating body. Here it is most important to insist that the equator, Tropics of Cancer and Capricorn, and the Arctic Circles are not drawn on maps and globes arbitrarily but are due to the apparent motion of the sun, *i. e.*, to the varying positions of the earth in its annual revolution round the sun. Boys rarely realize this.

We next considered the effect of parallel rays of light striking the surface of the earth, and hence accounted for the fact that in the Northern Hemisphere we have the summer season when the earth is farthest from the sun. By using a small globe to represent the moon, eclipses may be shown very effectively, as also the phases of the moon.

I have as yet only described those lessons in which the globe has been the most prominent object; but in ordinary geography lessons a globe is indispensable. We can at once compare the area of one country with other countries, for all are drawn to one scale. The position of one country with regard to other countries can be seen at a glance. Trade routes can be pointed out, and distance by alternative routes can be compared. While agreeing with Professor Reclus

that projections on flat surfaces should be banished from our schools and that only maps drawn on curved surfaces should be used as being more in accordance with nature, it seems to me that for the present we must be content to compromise matters by using the most up-to-date maps in conjunction with a globe; so that, by constant comparison between the two, boys may become accustomed, when looking at a map, to picture in their imaginations the curved form of the portion of the earth's surface they are studying.—*The Geographical Teacher*, June, 1904.

First Lessons in Geography.—Within the last decade or two great changes have taken place in methods of teaching geography. The results of modern geography teaching must correspond to modern methods as shown in the pupil's idea of the earth on which he lives. To study geography in olden time was to learn the contents of the text-book. To study geography in the present day is to gain, as far as possible, an objective knowledge of the earth and to imagine and reason from the known to the unknown.

In country schools there is fine opportunity for pupils to learn by observation the natural forms of land and water. The brook, the river, the pond, the lake, the slope, the hill, and other features of the surface of the earth in the vicinity of the school, are in themselves object lessons if the minds of the pupils are trained to see for themselves.

The first lessons in geography are properly nature stories without the use of a text-book. Such lessons in nature study are usually found in the courses of study for city schools. In ungraded schools all the pupils who are not studying the printed book in geography may be placed in one class. Even the youngest pupils need not be excluded from the simplest lessons, particularly those which are objective, for they can gain practical ideas which will create a taste for the further study of the earth.

The teacher of oral geography may select from the natural features of the district some one prominent for study. When possible, study slope first, for a hill is an object of interest pleasurable when connected with the play of the children.

Flowing waters are also objects of interest to children, affording them sport. The teacher may illustrate the terms source, course, and mouth of a stream, in the schoolroom, and take her class for field study later, or she may give the first lesson from Nature's book, and follow with oral lessons in the schoolroom. Lessons on a stream may

be succeeded by lessons on a watershed. In the meantime, instruction should be given on the points of the compass. Great care should be taken that the pupils know the directions north, south, east, and west, outside of the schoolroom as well as in it. This result can be accomplished by questioning the class about the direction of the road or street in front of the school, or the direction from the schoolhouse of another school building, or of the homes of individual pupils. Lessons in map reading may be given by the teacher placing a line on the board from south to north, and another north to south, the two lines being continuous but for a little space intervening. These lines are to represent rivers, the space between the lines the height of land where each river has its source. Each stream may be named after some pupil in the class. Questions will test the pupil's ability to imagine slope. They may be sent to the board to point to the source, the mouth, to show which river flows north, which south. In a similar way forms of land may be taught, as valley, plain.

When features of the earth not found in the neighborhood are to be taught, the good teacher of geography will have a supply of pictures to illustrate the subject. Frye's *Brooks and Brook Basins* is a most helpful book for the teacher commencing oral geography.

In the winter months when field studies cannot be pursued, the teacher may read from *Seven Little Sisters*. This is a book most interesting to all children, as it gives them the first glance at children differing from themselves living on other parts of the globe. It is a known fact that the children they study about become real personages to the pupils who learn of their habits and customs. The teacher reads and the pupils afterward reproduce, either orally or in writing. However, before this part of oral geography is taken, some ideas must be gained by pupils about the shape of the earth. Any common sphere may be used to lead up to the globe. On the globe locate the point where they live. To some children, even bright ones, it is a wonder that we live on the outside of the earth. No definite size of the earth should be given thus early, only that it is very large.

In the spring-time lessons in market gardening and farming may be given, covering the kind of products raised. A few lessons on some of the products may be taught. Such lessons illustrate one occupation of man. A game may be used which is imaginative, as are some lessons in the kindergarten, in which the products of the garden or farm are sold and other products bought. Such a game would illustrate another occupation of man.

XUM

If there are manufactories in the vicinity of the school, one or more talks may be given on what is made in these, and an exercise follow in which all articles in the schoolroom which are manufactured may be named. This exercise illustrates a third occupation. Afterward pupils may name persons whom they know who are engaged in agriculture, in manufacture, in commerce.

After such preparation in studying real objects in geography as slope, stream, plain, the points of the compass, the shape of the earth, stories of other children who live on the earth, and what kinds of work men and women do, we may commence the study of a map. Let the children make a map of the district or the part of it in which the school is located. It will mean more at first to the children if made on the floor, or on paper or cloth placed on the floor, as the points of the compass can be kept true. If made on paper or cloth, it may afterward be hung against the wall, telling the children that men have agreed to call the top of the map north. When the first map is understood the teacher is ready to begin the study of the state in which the class live, as Ohio. If the pupils live near one of the limits of the state, commence with that boundary, as in the northern section we should begin with the southern shore of Lake Erie; in the southern section with the Ohio River. The teacher may place the outline of the state on the board. If she can do it in the presence of the class much more interest will be aroused. After the outline is drawn, pupils may travel from the school north to Lake Erie, south across the Ohio River to West Virginia or Kentucky, east to Pennsylvania or West Virginia, and west to Indiana. Such exercises must be frequent. The teacher may tell the children that these are our neighbors and we must know their names and which way to go to visit them. The class may next study the flowing streams. They may commence in the part of the state in which they live; that is, all living south of the watershed would first study the Muskingum, the Scioto, or the Miami rivers. Which one of these to study first would depend on the location of the pupils studying. The study reviews the idea of slope. The study of rivers flowing in the opposite direction develops another slope, and the fact that here is a watershed. At the proper time the Ohio River is studied, and Lake Erie. If the surface of the map is colored, brown being used for high land and green for low land, the surface of the state can be well shown. The teacher should develop the idea of a state. No better lesson can be given combining civics and geography than Sir William Jones' poem, "What

Constitutes a State?" Children should memorize the first half ending with

"Men who their duties know,
But know their rights, and, knowing, dare maintain."

Lessons may follow on Ohio, its climate, soil, products, vegetable and mineral, the occupation of its inhabitants, its leading cities, railroads, and canals. If an electric road passes near the school, the pupils might study about the towns it connects, or if several suburban lines enter the town where the school is located a map may be made of these. In the meantime pupils may draw the outline of the state, its principal rivers, and locate its leading cities. They may also model in sand. Molder's sand is suitable for modeling. But children have made a model of Ohio in the playground without the presence of the teacher, because they were so much interested in their lessons in geography. When such studies in oral geography have been pursued, pupils are ready to take a text-book and use it intelligently.

I cannot believe but that in geography the starting point is at home. Working with younger pupils from the near and known, interest is developed in the first study of geography which grows with their growth.—*Ohio Educational Monthly.*

Acclimatization of the White Race in the Tropics.—With the present rapid advance of medical science, it is likely that the views up to this time generally held regarding the acclimatization of the white race in the tropics may have to be somewhat modified. Two striking campaigns are now being waged, by men of our own race, against certain tropical diseases which have been among the greatest obstacles to the settlement of the tropics by northern peoples. Both of these campaigns are described in the *Review of Reviews* for July. In Porto Rico, Drs. Bailey K. Ashford and W. W. King, together with Dr. Pedro Gutierrez, constituting an Anæmia Commission, and acting under an appropriation made by the Legislature of Porto Rico, are engaged in studying and treating anæmia, which causes nearly one-quarter of the deaths on the island. Drs. Ashford and King believe that anæmia is caused by parasites in the blood, which destroy the hemoglobin, and they are using thymol to expel the parasites. After treatment there is a rise in the amount of hemoglobin and a gain in vitality. Great success seems already to have been attained.

In "Solving the Health Problem at Panama," Col. Wm. C. Gorgas, of the Medical Corps, U. S. Army, who is in charge of the sanitary work of the American Government on the isthmus, outlines the plan of campaign against yellow fever and malaria. The general scheme is to keep in touch with these and other infectious diseases by getting "all the sick from the whole population to come to the sanitary department for treatment." Mosquito brigades will be organized, which, so far as possible, will destroy the mosquitoes that act as carriers of yellow fever and malaria. A census of all cases of these diseases is to be taken, and it is proposed "to find out who have malaria, make a record of each individual case, and keep them under daily treatment till the malarial parasite has disappeared from the blood." Patients ill with yellow fever and malaria will be placed under screening, as was done at Havana after American occupation, and thus no mosquitoes can bite them, and then carry the infection to other persons. Such a campaign, intended to free a whole population from these diseases, has never yet been tried on so large a scale, and the results will certainly be watched with the greatest interest.

In this connection it may be noted that in the Nile province of Uganda, it is planned to have each house occupied by English officials provided with at least one mosquito-proof room, fitted with mosquito netting.—*Scot. Geogr. Mag.*, July, 1904, 379.

Forests and Climate in Texas.—*The Timber of the Edwards Plateau of Texas* is the title of Bulletin No. 49, Bureau of Forestry, by W. L. Bray. The Edwards Plateau, which is the southernmost province of the Great Plains, is a very important catchment area for water, most of which is given up to the plains, either immediately, in the form of destructive floods, or gradually, through streams or artesian wells. The limestones of which the plateau is made up are very favorable for taking up water by reason of their exposure, tilling, their extensive systems of fissures and caverns, and their general nature. The rainfall averages about twenty-five inches annually, and the timber is of the greatest importance in preventing excessive erosion and destructive floods, and in conserving the water in the undergrowth and forest litter. The statements concerning the influence of the timber growth upon climate are in accordance with the view generally held by scientific men, viz., that "final conclusions have not yet been reached," but the effect of the trees in shading the ground and thus preventing excessively high temperatures from

being reached, and the effect of the transpiration of water vapor, are noted. It is only through the constant reiteration of the right view of the position of the forest in relation to climate that the common and highly erroneous ideas of the climatic influences of forests can be successfully combated.—*R. DeC. W.*

EDITORIAL

HOME GEOGRAPHY

HOME Geography, now recognized as being the fundamental phase of any rationally ordered course of study in geography, is based upon the well established principle of teaching, that a child must begin with that which is near and personal and work out to the remote and unfamiliar features of the world which cannot be personally seen and directly studied. Home geography as taught, however, is not always made as foundational as it might be for the reason that teachers do not choose the topics to be presented with sufficient care, and do not draw out the relations between the many features of their geographic environment so as to make the study thought- and question-inspiring.

Home geography should not include all the features of the home region just because they can be seen from the school window. For then home geography becomes a mere catalogue of facts taken in a chance order and is deadly as a subject for provoking interest and observational study.

The difficulties of teaching the subject are many, for no phase of geography is so complicated and difficult to present understandingly as that great complex of physical, biological, and social facts which make up the geography of the home region. A great step in advance can be made if interested teachers will get together and study the home geography of their own locality, and prepare an abstract or even a paper of some length for their colleagues to whom geography teaching is a bugbear.

The home geography of no two regions is alike, and the subject cannot be presented in exactly the same way in two different places. The relationships to be seen and the points to work for are practically the same, but the details, the flesh to clothe the skeleton of principles, vary according to the locality.

Teachers who care to organize the home geography of their

region should not merely follow the plan of their school course of study, but should go deeper and attack the problem as a problem in geography primarily, and in geography teaching only when they have mastered the geography. Workers in this field would do well to take as a guide a little book like Herbertson's *Man and His Work*, or like Professor Davis' article on Home Geography in the JOURNAL OF SCHOOL GEOGRAPHY for January, 1897, for both of these are full of suggestions as to how to see relationships in the geography about one.

The topic of home geography is so new that it is not yet understood and there is much work to be done. It cannot all be done by remote geographers. The local students must help themselves by adapting the suggestions of others to their own localities, and in so doing will gain vigor, interest, and a love for nature as well as geography.

REVIEW

North America. By Israel C. Russell. Pp. x and 435. Appleton's World Series. New York: D. Appleton & Co., 1904.

Russell's *North America* is primarily a volume for the general reader and does not form as valuable a book of reference as could be desired. It includes extended accounts of the topography, climate, plant and animal life, geology and aborigines of North America, but is extremely deficient on the political, social, and economic sides. This lack, however, is not due to the author, but to the fact that the volume was planned to cover the whole continent and hence all parts of the geography could not be included in the space provided. This is particularly unfortunate, for the portions of the subjects treated are more readily available in the existing literature of geography than are the subjects omitted or seriously condensed.

Although all the chapters are extremely readable (except where fine writing is indulged in) the most valuable for teachers are those on the plants, animals, and aborigines. In the chapter on topography and climate Professor Russell has not followed the classifications usually adopted by workers in these subjects. Hence teachers who want to pass from the book to the detailed literature will find the chapters less usable than they might be.

The illustrations are few, much fewer than they might well be, a lack which has been thus far characteristic of the series. The maps are well drawn and executed and are valuable adjuncts to the text.

Though the volume is not of the standard teachers have long needed, it is extremely valuable for reference and should be in every school library.

R. E. D.